BC Hydro
Power smart

6911 Southpoint Drive (B03)
Burnaby, BC
V3N 4X8

July 30, 2024

[redacted]

[redacted]

[redacted]

RE: CEAP IR 113 - [redacted] - Interconnection Feasibility Study Report

Enclosed is the Interconnection Feasibility study report for the proposed [redacted] submitted under Attachment M-2: Transmission Service and Interconnection Service Procedures for Competitive Electricity Acquisition Process (CEAP) of the Open Access Transmission Tariff (OATT). This letter provides a non-binding good faith estimate of the cost and time to construct the facilities required to interconnect your project to BC Hydro's Transmission System, being the Network Upgrades, based on the findings of the Interconnection Feasibility study.

Open Access Transmission Tariff

The OATT defines Network Upgrades as additions, modifications, and upgrades to BC Hydro's Transmission System required at or beyond the Point of Interconnection to accommodate the interconnection of the Generating Facility to the BC Hydro's Transmission System. Pursuant to the OATT, BC Hydro will design, procure, construct, install, and own the Network Upgrades. While BC Hydro will pay the costs for the Network Upgrades, the Interconnection Customer provides security for such costs.

Cost Estimate

Based on the Interconnection Feasibility study, the non-binding good faith estimated cost (typical accuracy range of +150%/-50%) for Network Upgrades required to interconnect your project is $115.0M.

Major Scope of Work Identified:

- Acquire adequate property for a new substation close to the existing transmission line 60L270
- Construct a new outdoor 60kV, 3- circuit breaker ring bus AIS switching substation
- Construct a new control building and other required substation facilities and infrastructures
- Thermal upgrade of 60L270 is required
- Supply and install protection relays and other required protection equipment
- Supply and install microwave towers, waveguides, antennas, and other required telecommunications equipment

Exclusions:

- GST
- Right-of-way
- Permits

Key Assumptions:

- Construction by contractor
- 3 years of construction
- No expansion of existing stations or control buildings to accommodate new equipment
- Early Engineering and Procurement
- No structural or foundation upgrade required for telecom tower modification at Baker Microwave Repeater station (BKR)
- No ground improvements will be required
- No piles will be required for construction
- No contaminated soil will be encountered during construction
- A Certificate of Public Convenience and Necessity (CPCN) requirement will not impact the schedule

Key Risks:

- Additional right of way or acquisition of more property may be required
- Existing microwave towers may need to be upgraded at various sites to accommodate new equipment leading to increased costs
- Transmission routing may be different than assumed, including number of disconnect switches and structure types may change
- No defined supply chain strategy, construction costs may increase depending on delivery method
- Cost of construction may increase based on geotechnical condition of the actual project site
- Project schedule may be longer than expected, leading to increased costs
- Costs may be affected by market conditions and escalation
- A CPCN requirement may delay the project schedule and increase costs

Please note that the Revenue Metering requirements and associated costs required to interconnect your project have not been determined at this stage and, therefore, not included in the above estimate. Revenue Metering costs that are attributable to the Interconnection Customer are to be paid in cash. For more details on Revenue Metering requirements and responsibilities, please refer to:

https://www.bchydro.com/content/dam/BCHydro/customer-portal/documents/distribution/standards/ds-rmr-complex-revenue-metering.pdf.

Schedule

Based on the Interconnection Feasibility study, the non-binding good faith estimated in-service date for your project's Network Upgrades is Quarter 3 2031 (calendar year). To achieve this timeline, we may need to expedite certain activities, including engineering design and procurement of long-lead equipment.

Timely actions required from you to minimize risks to the schedule:

- Submission of additional technical data required for the System Impact Study and Facilities Study
- Submission of any required information or document such as demonstration of Site Control
- Execution of Combined Study Agreement and Standard Generator Interconnection Agreement
- Financial commitments and securities

Please note that changes to your interconnection request, delays in data submission, or financial commitments may also impact the target in-service date.

Next Steps

In September 2024, we will issue a final invoice for the Feasibility Study costs. This invoice will reflect the total amount due, taking into account the $15,000 Feasibility Study deposit you have already paid and any remaining amount on the non-refundable $15,000 Interconnection request deposit that we did not spend in reviewing and validating your interconnection request.

If you have any questions, please contact the BC Hydro CEAP Team at ceap2024@bchydro.com.

Sincerely,

[redacted]

Senior Manager, Transmission Interconnections

BC Hydro

Encl.: CEAP2024_IR_113_[redacted]FeS_Report_final.pdf

[redacted]

Interconnection Feasibility Study

BC Hydro EGBC Permit to Practice No: 1002449

2024 CEAP IR # 113

Prepared for: [redacted]

[redacted]

100-APR-00006
2024 Jul 30

Report Metadata

Header:	[redacted]
Subheader:	Interconnection Feasibility Study
Title:	[redacted]
Subtitle:	2024 CEAP IR # 113
Report Number:	100-APR-00006
Revision:	0
Confidentiality:	Public
Date:	2024 Jul 30
Volume:	1 of 1

[redacted]

Related Facilities:	60L270
Additional Metadata:	Transmission Planning 2024-109 Filing Subcode 1350

Revisions

Revision	Date	Description
0	2024 Jul	Initial release

Disclaimer of Warranty, Limitation of Liability

This report was prepared solely for internal purposes. All parties other than BC Hydro are third parties.

BC Hydro does not represent, guarantee or warrant to any third party, either expressly or by implication:

any information, product or process disclosed, described or recommended in this report.

BC Hydro does not accept any liability of any kind arising in any way out of the use by a third party of any information, product or process disclosed, described or recommended in this report, nor does BC Hydro accept any liability arising out of reliance by a third party upon any information, statements or recommendations contained in this report. Should third parties use or rely on any information, product or process disclosed, described or recommended in this report, they do so entirely at their own risk.

This report was prepared by the British Columbia Hydro And Power Authority ("BCH") or, as the case may be, on behalf of BCH by persons or entities including, without limitation, persons or entities who are or were employees, agents, consultants, contractors, subcontractors, professional advisers or representatives of, or to, BCH (individually and collectively, "BCH Personnel").

This report is to be read in the context of the methodology, procedures and techniques used, BCH's or BCH's Personnel's assumptions, and the circumstances and constraints under which BCH's mandate to prepare this report was performed. This report is written solely for the purpose expressly stated in this report, and for the sole and exclusive benefit of the person or entity who directly engaged BCH to prepare this report. Accordingly, this report is suitable only for such purpose, and is subject to any changes arising after the date of this report. This report is meant to be read as a whole, and accordingly no section or part of it should be read or relied upon out of context.

Unless otherwise expressly agreed by BCH:

(a) any assumption, data or information (whether embodied in tangible or electronic form) supplied by, or gathered from, any source (including, without limitation, any consultant, contractor or subcontractor, testing laboratory and equipment suppliers, etc.) upon which BCH's opinion or conclusion as set out in this report is based (individually and collectively, "Information") has not been verified by BCH or BCH's Personnel; BCH makes no representation as to its accuracy or completeness and disclaims all liability with respect to the Information;

(b) except as expressly set out in this report, all terms, conditions, warranties, representations and statements (whether express, implied, written, oral, collateral, statutory or otherwise) are excluded to the maximum extent permitted by law and, to the extent they cannot be excluded, BCH disclaims all liability in relation to them to the maximum extent permitted by law;

(c) BCH does not represent or warrant the accuracy, completeness, merchantability, fitness for purpose or usefulness of this report, or any information contained in this report, for use or consideration by any person or entity. In addition, BCH does not accept any liability arising out of reliance by a person or entity on this report, or any information contained in this report, or for any errors or omissions in this report. Any use, reliance or publication by any person or entity of this report or any part of it is at their own risk; and

(d) In no event will BCH or BCH's Personnel be liable to any recipient of this report for any damage, loss, cost, expense, injury or other liability that arises out of or in connection with this report including, without limitation, any indirect, special, incidental, punitive or consequential loss, liability or damage of any kind.

Copyright Notice

[redacted]

Executive Summary

[redacted] the Interconnection Customer (IC), requests to interconnect its [redacted] (2024 CEAP IR # 113) to the BC Hydro system. [redacted] has sixteen (16) [redacted] solar inverters with total installed capacity of 51.84 MW. The IC's proposed Point of Interconnection (POI) is on BC Hydro's 60 kV line 60L270, approx. 3.4 km from Skookumchuck Substation (SKU). The IC's project will connect to the POI via a 0.15 km 60 kV interconnection line. The proposed commercial operation date (COD) is Oct 1, 2028.

To interconnect the [redacted] and its facilities to the BCH Transmission System at the proposed POI, this Feasibility Study has identified the following conclusions and requirements:

1. A new 60 kV switching station (referred to as "P113T") on 60L270 is required at the proposed POI for interconnecting the IC's generating project to the BCH system. With the new switching station P113T, 60L270 will be segregated into two segments, new three lines are temporarily referred to as: 60L270_A (MVL-P113T), 60L270_B (P113T-SKU/INV) and 60L270_C (P113T-P113).

2. The connection of [redacted] will cause 60L270_A line overload under system normal in the summer load conditions (30HS & 30LS). To remove the N-0 line overload concern on 60L270_A, the 29 km 60L270_A line is required to be uprated to at minimum 470 Amp under summer (30°C) ambient temperature. With the thermal upgrade, structure replacement may be required.

3. For single contingencies (P1 60L270_A contingency or P2.1 60L270_A breakers opened at P113T), overloading and low voltage conditions can be observed on 60L270_B between SKU Tap and INV in the summer load conditions. To address the identified N-1 line overloading/low voltage concerns, a signal will be initiated to shed or run back generation at the IC's facility. The overload/low voltage detection mechanism and exact mitigation actions will be determined at the next study stage.

4. In addition to the project's entrance protection and 60L270_C line protection, the IC is required to install anti-islanding protection within their

facility to disconnect the [redacted] site from the grid when an inadvertent island with the local load forms.

5. BC Hydro will provide line protections for 60L270_A at MVL and P113T, 60L270_B at P113T and INV, and 60L270_C at P113T. As part of the line protection for each of the three lines, telecommunication facilities will be required to accommodate the new protection schemes. The IC shall provide required relays, telecom facility and associated equipment at its facilities to accommodate the new protection schemes.

The above conclusions are made based on the IC's input data and study assumptions listed in Section 4, which represent the best available information on May 22, 2024.

A non-binding good faith estimated cost and time to construct the Network Upgrades required to interconnect the proposed project will be provided in a separate letter to the IC.

Contents

Executive Summary **vii**

1 Introduction **12**

2 Purpose and Scopes of Study **14**

3 Standard and Criteria **15**

4 Assumptions and Conditions **16**

5 System Studies and Results **17**

5.1 Power Flow Study Results 17

5.1.1 Branch Loading Analysis 17

5.1.2 Steady-State Voltage Analysis 19

5.1.3 Reactive Power Capability Evaluation 19

5.1.4 Anti-Islanding Requirements 20

5.2 Fault Analysis 20

5.3 Stations Requirements 20

5.4 Transmission Line Requirements 21

5.5 Protection & Control Requirements 21

5.6 Telecommunications Requirements 22

6 Cost Estimate and Schedule **24**

7 Conclusions **25**

Appendices

Appendix A Plant Single Line Diagram Used for Power Flow Study
Appendix B One-Line Sketch for New Switching Station

Acronyms

The following are acronyms used in this report.

BCH	BC Hydro
CEAP	Competitive Electricity Acquisition Process
COD	Commercial Operation Date
DTT	Direct Transfer Trip
EDM	Edmonds Office
ERIS	Energy Resource Interconnection Service
FeS	Feasibility Study
FVO	Fraser Valley Office
IBR	Inverter-Based Resources
IC	Interconnection Customer
LAPS	Local Area Protection Schemes
MPO	Maximum Power Output
NERC	North American Electric Reliability Corporation
NRIS	Network Resource Interconnection Service
OATT	Open Access Transmission Tariff
POI	Point of Interconnection
RAS	Remedial Action Scheme
SIO	South Interior Office
TIR	BC Hydro “60 KV to 500 kV Technical Interconnection Requirements for Power Generators”
WECC	Western Electricity Coordinating Council

1 Introduction

Table 1-1 below summarizes the project reviewed in this Feasibility Study.

Table 1-1 Summary of Project Information

Project Name	[redacted]	
Name of Interconnection Customer (IC)	[redacted]	
Point of Interconnection (POI)	on 60L270 at 3.4 km from Skookumchuck substation (SKU).	
IC's Proposed COD	1st October 2028	
Type of Interconnection Service	NRIS ☒	ERIS ☐
Maximum Power Injection [1] (MW)	50 MW (Summer)	50 MW (Winter)
Number of Generator Units	16 x 3.24 MW	
Plant Fuel	Solar	

[redacted] the Interconnection Customer (IC), requests to interconnect its [redacted] (2024 CEAP IR # 113) to the BC Hydro system. [redacted] has sixteen (16) [redacted] solar inverters with total installed capacity of 51.84 MW. The IC's proposed Point of Interconnection (POI) is on BC Hydro's 60 kV line 60L270, approx. 3.4 km from Skookumchuck Substation (SKU). The IC's project will connect to the POI via a 0.15 km 60 kV tie line. The proposed commercial operation date (COD) is Oct 1, 2028. The electrical configuration of the project is shown in Appendix A.

Figure 1-1 shows the South Interior East (SIE) region 500/230/60 kV transmission system topology diagram when the proposed [redacted] (#113) will be in-service. Cranbrook Substation (CBK) is a major substation in the Cranbrook area. The substation provides a 500 kV connection to Alberta, supplies the Invermere Substation (INV) via the 230 kV transmission line 2L258, and connects to Natal Substation (NTL) via 2L113 and Nelway Substation (NLY) via 2L294. Additionally, CBK also facilitates 60 kV connections to local substations and generating stations.

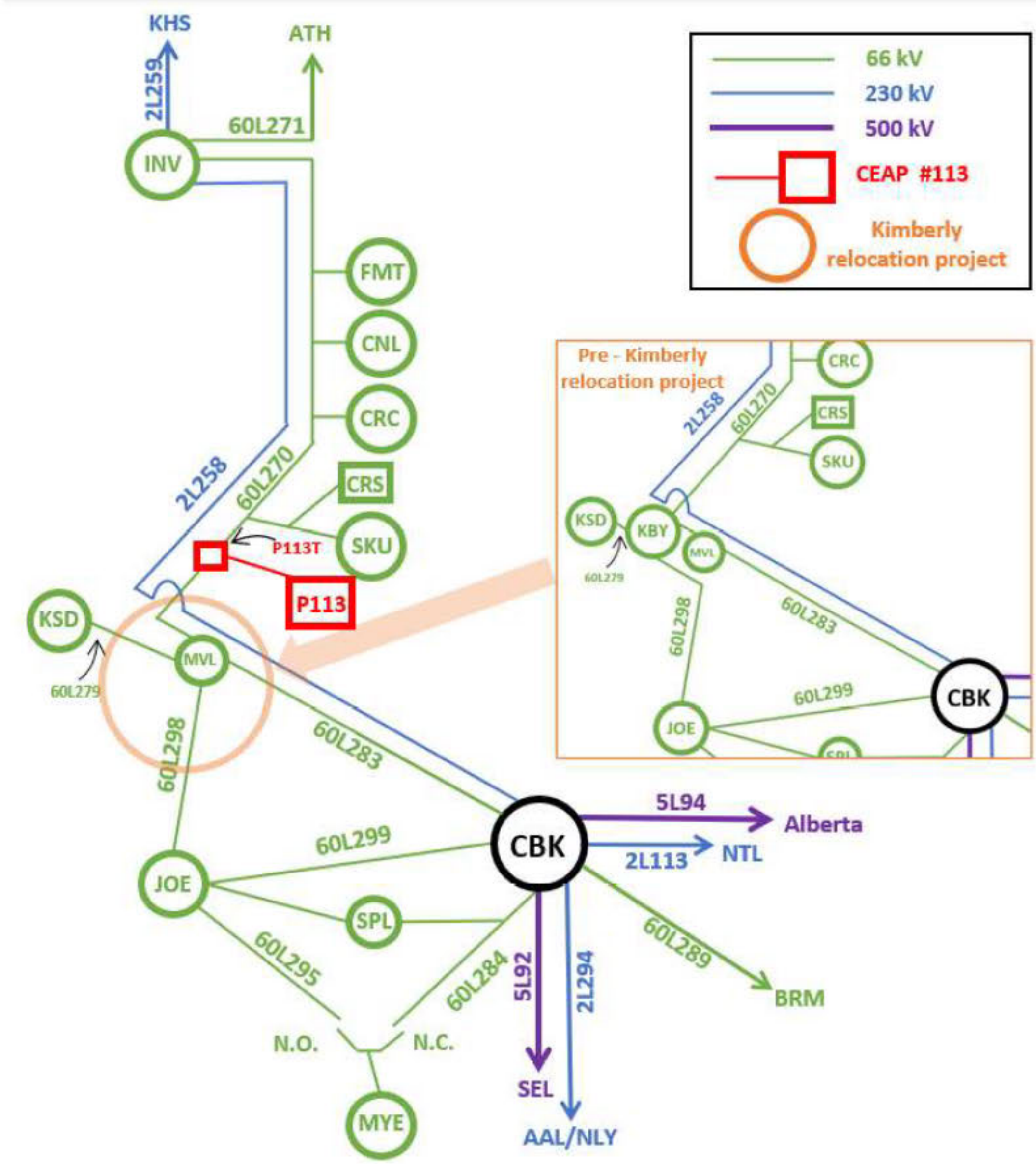

Figure 1-1: [redacted] Plant in SEI region

Prior to the [redacted] the existing 60 kV Kimberly (KBY) Substation will be decommissioned as planned. After decommissioning KBY, the existing 60 kV circuits 60L270, 60L283 and 60L298 currently terminated at KBY will be re-terminated at the to-be-rebuilt Marysville Substation (MVL), and the load at KSD will be served from the MVL via a renamed line 60L279 (MVL-KSD). An existing small solar farm Sun Mine (close to 1 MW) is connected to KSD.

2 Purpose and Scopes of Study

This Feasibility Study is a preliminary evaluation of the system impact of interconnecting the proposed project to the BC Hydro system based on power flow and short circuit analysis in accordance with BCH's Open Access Transmission Tariff (OATT). A non-binding good faith estimated cost of required Network Upgrades and estimated time to construct will be provided.

Per OATT, the feasibility study is performed individually for each of the participating projects in the CEAP process and focuses specifically on the BC Hydro regional transmission system where the proposed generating project is proposed to be constructed. An assessment of the incremental effect on the 500kV bulk transmission system is beyond this study scope.

This is a "limited scope" study which is restricted to power flow studies of P0, P1 and P2 planning events as defined in TPL-001-4 and short circuit analysis. The study does not address other technical aspects such as transient stability and switching transients and impact of multiple contingencies. These subjects would be addressed in subsequent System Impact Study if the project is a Successful Participant of the CEAP.

In case impact to the adjacent external systems to BC Hydro is observed, such impact would be addressed in subsequent detailed and coordinated studies with the relevant adjacent entities if the proposed interconnection proceeds further.

3 Standard and Criteria

The Feasibility Study is performed in compliance with the North American Electric Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) reliability standards, and the BCH interconnection requirements in the TIR, and upon the ratings of the existing BCH transmission facilities described in Operating Orders, specifically:

- NERC standards: TPL-001-4 and FAC-002-3 relevant to the scope of this Feasibility Study.
- WECC criteria TPL-001-WECC-CRT-4 Transmission System Planning Performance, July 1, 2023.
- BC Hydro's 60 kV to 500 kV Technical Interconnection Requirements for Power Generators.
- BC Hydro Operating Order 5T-10, Ratings for All Transmission Circuits 60 kV or Higher, April 16, 2024.
- BC Hydro Operating Order 5T-14, Ratings for All Transmission and Distribution Transformer, November 8, 2022.
- BC Hydro System Operating Order 7T-22 System Voltage Control, September 19, 2023.

4 Assumptions and Conditions

This Feasibility Study is performed based on the IC's submitted data and information available to BC Hydro on May 22, 2024 for the study purpose. Appendix A shows the plant single line diagram for the IC's project used in the study model. Certain assumptions were, as set out below, made to the extent required.

The power flow study cases used in this Feasibility Study are established based upon the BC Hydro's base resource plan and load forecasts available at the time of performing the study, which includes existing and future generations, transmission facilities, and loads in addition to the subject interconnection project in this study. Applicable seasonal conditions and the appropriate study years for the study planning horizon are also incorporated.

Additional assumptions are listed as follows:

1) The regional generation are dispatched to the patterns that stress the transmission system in the study area. In these patterns, the regional generations are typically set to their Maximum Power Outputs (MPO) unless otherwise specified.

2) Kimberly relocation project is assumed to be completed by the time the [redacted] is in-service.

5 System Studies and Results

Based upon the IC's submitted information and the area system conditions, a new switching station (referred to as "P113T") at the proposed POI on 60L270 is required to interconnect the IC's generating project to the BCH system. There are multiple terminals and multiple sources on the existing line 60L270. The addition of the new switching station would help to maintain reliability and adequate protection performance to serve the existing customers and the new addition.

With the new switching station P113T, the existing line 60L270 will be segregated into two segments, and three new lines are temporarily referred to as: 60L270_A (MVL-P113T), 60L270_B (P113T-SKU/INV) and 60L270_C (P113T-P113). The temporary line designations will be replaced by permanent designations at a later stage of interconnection study.

5.1 Power Flow Study Results

Power flow studies were performed to evaluate whether the IC's generating project would cause any unacceptable system performance (e.g. equipment overloads, steady-state voltage violation and voltage instability) and to determine the reinforcement requirement based on steady state performance analysis.

The study focuses on the 2029 light summer (29LS) system load condition which is typically a stressed condition for a generation interconnection project, taking into considerations of factors such as load conditions, seasons and generation patterns. The 2029 heavy summer (29HS) and 2028 heavy winter (28HW) cases are also checked at a high level to capture any possibility of performance violations under high load conditions.

5.1.1 Branch Loading Analysis

Table 5-1 shows a summary of branch loading analysis under system normal and single contingencies (Category P1 and P2) for various load conditions.

The study shows 60L270_A line overload under system normal conditions in the summer load conditions (30HS & 30LS). For single contingencies (P1 60L270_A contingency or P2.1 60L270_A breakers opened at P113T without a fault), 60L270_B between SKU Tap and INV could be overloaded in the summer load conditions. These situations arise because [redacted] can inject up to 50 MW into the 60 kV system, which has limited 60 kV line capacities, particuliary during the summer load season.

To mitigate the N-0 line overload concern on 60L270_A, the 29 km 60L270_A line is required to be uprated to at minimum 470 Amp under summer (30°C) ambient temperature. For the N-1 line overloading concerns, a signal will be initiated to shed or run back generation at the IC's facility. The overload detection mechanism and exact mitigation actions will be determined at the next study stage.

Table 5-1: Summary of Branch Loading Analysis Results

Case	IC's Plant Output	Contingency Identified		Branch Loading						
		Cat.	Description	60L270 A MVL – P133T	60L270 B P133T – SKU Tap	60L270 B SKU Tap – CRC Tap	60L270 B CRC Tap – CNL Tap	60L270 B CNL Tap – FMT Tap	60L270 B FMT Tap – ATH Tap	60L270 B ATH Tap – INV
Winter Rating				56 MVA	56 MVA	56 MVA	56 MVA	56 MVA	65.2 MVA	68.9 MVA
28 HW	Max	P0	System Normal	69.5 %	21.4 %	62.2 %	61.8 %	56.3 %	39.8 %	37.0 %
		P1	60L270_A OOS	N/A	87.3 %	126.4 %	126.2 %	119.6 %	92.7 %	87.2 %
		P1	60L270_B OOS	87.2 %	N/A	N/A	N/A	N/A	N/A	N/A
		P2.1	60L270_A breakers at P113T	N/A	87.3 %	126.4 %	126.2 %	119.6 %	92.7 %	87.2 %
		P2.1	60L270_B breakers at INV	108 %	27.9 %	21.9 %	21.9 %	15.1 %	N/A	N/A
Summer Rating				39.9 MVA	39.9 MVA	39.9 MVA	39.9 MVA	39.9 MVA	46.1 MVA	68.9 MVA
29 HS	Max	P0	System Normal	112.9 %	16 %	75.8 %	75.3 %	71.9 %	56.7 %	37.4 %
		P1	60L270_A OOS	N/A	122.9 %	181.5 %	181.2 %	176.9 %	146.8 %	97.7 %
		P1	60L270_B OOS	146 %	N/A	N/A	N/A	N/A	N/A	N/A
		P2.1	60L270_A breakers at P113T	N/A	122.8 %	181.4 %	181.1 %	176.7 %	146.7 %	97.6 %
		P2.1	60L270_B breakers at INV	171.5 %	53.5 %	13.4 %	13.4 %	8.8 %	N/A	N/A
29 LS	Max	P0	System Normal	115.9 %	13.7 %	74 %	73.4 %	71 %	57.4 %	37.9 %
		P1	60L270_A OOS	N/A	122.8 %	181.5 %	181.2 %	178.2 %	149.8 %	99.7 %
		P1	60L270_B OOS	126.9 %	N/A	N/A	N/A	N/A	N/A	N/A
		P2.1	60L270_A breakers at P113T	N/A	122.8 %	181.5 %	181.2 %	178.2 %	149.8 %	99.7 %
		P2.1	60L270_B breakers at INV	176.1 %	56.6 %	9.2 %	8.9 %	6 %	N/A	N/A

5.1.2 Steady-State Voltage Analysis

With the connection of the IC's project, the voltage performance under system normal condition is acceptable for all the three load conditions (29LS, 29HS, 28HW). However, N-1 contingency (Category P1 and P2.1) of 60L270_A could lead to low voltages on 60L270_B path from P113T switching substation to INV in all the study conditions (28HW, 29LS, 29HS). The low voltage concerns were caused by the high MW transfer-out from the IC site to INV through 60L270_B. As stated in Section 5.1.1, a signal will be initiated to shed or run back generation at the IC's facility. The overload/ low voltage detection mechanism and exact mitigation actions will be determined at the next study stage.

Table 5-2 shows a summery of steady-state voltage performance under various system conditions and contingencies.

Table 5-2: Summary of Steady-State Voltage Study Results

Case	IC's Plant Output	Contingency		Bus Voltage (PU)						
		Cat.	Description	MVL 66	P113T	SKU 66	CRC 66	CNL 66	FMT 66	INV 66
28HW	Max	P0	System Normal	1.019 PU	1.050 PU	1.046 PU	1.014 PU	1.014 PU	1.016 PU	1.061 PU
		P1	60L270_A OOS	1.042 PU	1.030 PU	1.016 PU	0.903 PU	0.901 PU	0.896 PU	0.990 PU
		P1	60L270_B OOS	1.010 PU	1.056 PU	N/A	N/A	N/A	N/A	1.050 PU
		P2.1	60L270_A breakers at P113T	1.044 PU	1.030 PU	1.016 PU	0.903 PU	0.901 PU	0.896 PU	0.990 PU
		P2.1	60L270_B breakers at INV	0.996 PU	1.041 PU	1.039 PU	1.006 PU	1.005 PU	0.995 PU	1.050 PU
29HS	Max	P0	System Normal	1.010 PU	1.050 PU	1.047 PU	1.022 PU	1.0217 PU	1.023 PU	1.054 PU
		P1	60L270_A OOS	1.038 PU	1.028 PU	1.014 PU	0.891 PU	0.889 PU	0.879 PU	0.967 PU
		P1	60L270_B OOS	1.009 PU	1.056 PU	N/A	N/A	N/A	N/A	1.044 PU
		P2.1	60L270_A breakers at P113T	1.039 PU	1.028 PU	1.014 PU	0.891 PU	0.889 PU	0.879 PU	0.967 PU
		P2.1	60L270_B breakers at INV	0.983 PU	1.041 PU	1.041 PU	1.028 PU	1.028 PU	1.024 PU	1.053 PU
29LS	Max	P0	System Normal	1.015 PU	1.052 PU	1.050 PU	1.028 PU	1.028 PU	1.030 PU	1.057 PU
		P1	60L270_A OOS	1.047 PU	1.029 PU	1.015 PU	0.895 PU	0.893 PU	0.883 PU	0.969 PU
		P1	60L270_B OOS	1.015 PU	1.058 PU	N/A	N/A	N/A	N/A	1.048 PU
		P2.1	60L270_A breakers at P113T	1.048 PU	1.029 PU	1.015 PU	0.895 PU	0.893 PU	0.883 PU	0.969 PU
		P2.1	60L270_B breakers at INV	0.987 PU	1.043 PU	1.044 PU	1.038 PU	1.037 PU	1.036 PU	1.044 PU

5.1.3 Reactive Power Capability Evaluation

The BC Hydro TIR requires IBR power plant to have the dynamic reactive power capability at a minimum of +/- 33% of its MPO at the high voltage side of the IC's switchyard over the full MW operating range.

Based on the PSS/E power flow data submitted by the IC, the proposed generating project would be capable of meeting the BC Hydro's reactive capability requirement at the plant's maximum MW output, which is subjected to further verification in the next stage of interconnection study.

Furthermore, the BCH TIR requires the IC's project to provide sufficient reactive power capability over full MW operating range including at zero MW output level. According to the IC-provided reactive capability curve, the proposed solar inverter each has +/- 2.16 Mvar reactive capability at zero MW output, which means that the solar farm is capable of meeting the reactive power requirement at zero MW. This will need to be re-confirmed if the IC's project proceeds further.

5.1.4 Anti-Islanding Requirements

The [redacted] is not arranged for islanded operation. The IC is required to install anti-islanding protection within their facility to disconnect the [redacted] site from the grid when an inadvertent island with the local load forms.

Currently, an existing Direct Transfer Trip (DTT) to the CRS units is in place. The DTT signal is sent from KBY to CRS prior to opening both the INV and KBY terminals when faults are detected on 60L270. However, due to the topology changes resulting from the KBY relocation project and the proposed new switching substation (P113T), it is necessary to review and update the existing DTT logic.

5.2 Fault Analysis

The short circuit analysis in the FeS is based upon the latest BC Hydro system model, which includes the generating facility information and associated impedance data provided by the IC. A more detailed study will be performed at the system impact study stage if needed.

5.3 Stations Requirements

A new outdoor 60 kV, 3-circuit breaker ring bus Air Insulated Switchgear (AIS) switching substation will be built at the POI, close to the existing 60 kV transmission line 60L270. The existing transmission line 60L270 will be cut and looped in/out, and a 60 kV line from [redacted] will be terminated at the new substation. This new substation has been given the temporary name P113T.

The station upgrade scope at the new switching station P113T is as follows:

- Acquire adequate property for a new substation close to the existing transmission line 60L270.
- Construct a new outdoor 60 kV, 3 - circuit breaker ring bus AIS switching substation. Refer to the one-line sketch in Appendix B for details.
- Construct a new control building and other required substation facilities and infrastructures.
- Cut the existing 60L270 and loop into P113T.
- Terminate 60 kV line of [redacted] at P113T.

5.4 Transmission Line Requirements

Thermal upgrade of the 69 kV 60L270_A line between MVL and the proposed switching station is required for [redacted] The 29 km 60L270_A line is required to be uprated to at minimum 470 Amps under summer (30°C) ambient temperature.

With the thermal upgrade, structure replacement may be required. Coordination with BC Hydro distribution department may also be required as this portion of 60L270 has distribution underbuilds.

5.5 Protection & Control Requirements

BC Hydro will provide line protections for 60L270_A at MVL and P113T, 60L270_B at P113T and INV, and 60L270_C at P113T.

The IC is to provide the following for the interconnection of [redacted]

- Entrance protection that complies with the latest version of the "60 kV to 500 kV BC Hydro Technical Interconnection Requirements for Power Generators."
- Provide two SEL-411L-1 relays (firmware and options specified by BC Hydro) at the entrance of P113 station to provide protection coverage for 60L270_C. BC Hydro P&C Planning will provide core protection settings for these relays to protect transmission line 60L270_C during a

transmission line fault. Non-core protection such as local breaker failure, auto-reclosing, backup protection for station elements will not be provided by BC Hydro P&C Planning.
- The IC is responsible for NERC PRC-related tasks, settings to compliance standards within their facilities.
- The IC is responsible for providing a communications link for remote interrogation of the PPIS equipment by BCH servers.
- The IC is responsible to provide anti-islanding protection as stated in Section 5.1.

The runback schemes or RAS requirements stated in Section 5.1 are mainly to address the overloading concerns under contingencies, which are preliminary. These RAS requirements may utilize the communication channels required for protection purposes included in the cost estimate. If the proposed project proceeds through the CEAP process, subsequent System Impact Studies may identify additional RAS requirements for this interconnection. These RAS functional requirements will include initiating events, control actions, and latency times.

Depending on these supplementary requirements, additional telecommunication facilities may be needed to facilitate signal transmission between the BC Hydro substations and customer facilities.

5.6 Telecommunications Requirements

BC Hydro performed a high-level feasibility assessment of a telecom solution to meet the following requirements.

Teleprotection Requirements for Telecom

- WECC Level 3 PY & SY, MVL – P113T, with C37.94 interfaces.
- WECC Level 3 PY & SY, INV – P113T, with C37.94 interfaces.
- WECC Level 3 PY & SY, P113T – P113, with C37.94 interfaces.

Telecontrol Requirements for Telecom

- Two P113T SCADA circuits off FVO & SIO.
- One P113 SCADA circuit off FVO & SIO.
- One P113T REMACC circuit off EDM.

Other Requirements for Telecom

- Provide PY & SY T1s over separate OC3s between P113T - P113.
- Provide TMS circuit for P113T (end point TBD).

- Provide MPLS links and LSPs for new INV, P113T, and MVL MPLS nodes.

Certain assumptions were made for determining a potential telecom solution. Details of the telecom solution (e.g. assumptions made, alternatives investigated and work required for BCH and the IC) would be provided at the next study stage.

6 Cost Estimate and Schedule

The non-binding good faith estimated cost and time to construct the Network Upgrades required to interconnect the proposed project will be provided in a separate letter to the IC.

7 Conclusions

To interconnect the [redacted] and its facilities to the BCH Transmission System at the proposed POI, this Feasibility Study has identified the following conclusions and requirements:

1. A new 60 kV switching station (referred to as “P113T”) on 60L270 is required at the proposed POI for interconnecting the IC’s generating project to the BCH system.
2. The connection of [redacted] will cause 60L270_A line overload under system normal conditions in the summer load conditions (30HS & 30LS). To remove the N-0 line overload concern on 60L270_A, the 29 km 60L270_A line is required to be uprated to at minimum 470 Amp under summer (30°C) ambient temperature. With the thermal upgrade, structure replacement may be required. Coordination with BC Hydro distribution department may also be required as this portion of 60L270 has distribution underbuilds.
3. For single contingencies (P1 60L270_A contingency or P2.1 60L270_A breakers opened at P113T), overload and low voltage conditions can be observed on 60L270_B between SKU Tap and INV in the summer load conditions. The identified N-1 line overloading/low voltage concerns can be addressed by initiating a signal to shed or run back generation at the IC’s facility. The overload/low voltage detection mechanism and exact mitigation actions will be determined at the next study stage.
4. In addition to the project’s entrance protection and 60L270_C line protection, the IC is required to install anti-islanding protection within their facility to disconnect the [redacted] site from the grid when an inadvertent island with the local load forms.
5. BC Hydro will provide line protections for 60L270_A at MVL and P113T, 60L270_B at P113T and INV, and 60L270_C at P113T. As part of the line protection for each of the three lines, telecommunication facilities will be required to accommodate the new protection schemes. The IC shall provide required relays, telecom facility and associated equipment at its facilities to accommodate the new protection schemes.

Appendix A
Plant Single Line Diagram Used for Power Flow Study

Figure A-1 shows [redacted] single line diagram used for power flow study.

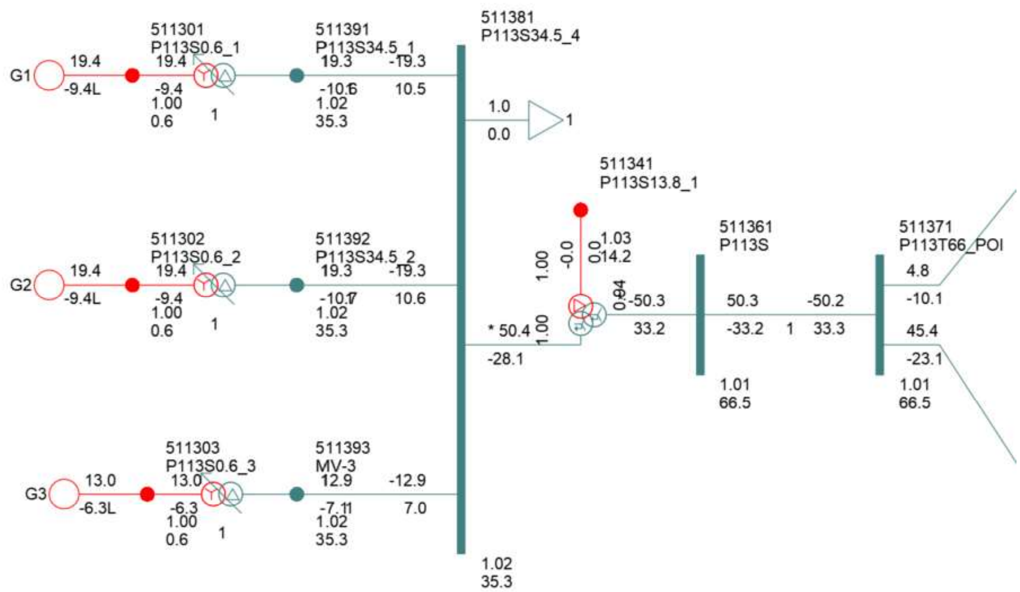

Figure A-1: [redacted] Single Line Diagram for Power Flow Study.

As seen in the diagram, [redacted] has one main power transformers dividing the plant into three (3) feeders. Each feeder has 4 to 6 solar inverters.

Appendix B

One-Line Sketch for New Switching Station

Figure B-1 shows the Stations Planning One-Line Sketch for the New Switching Station P113T.

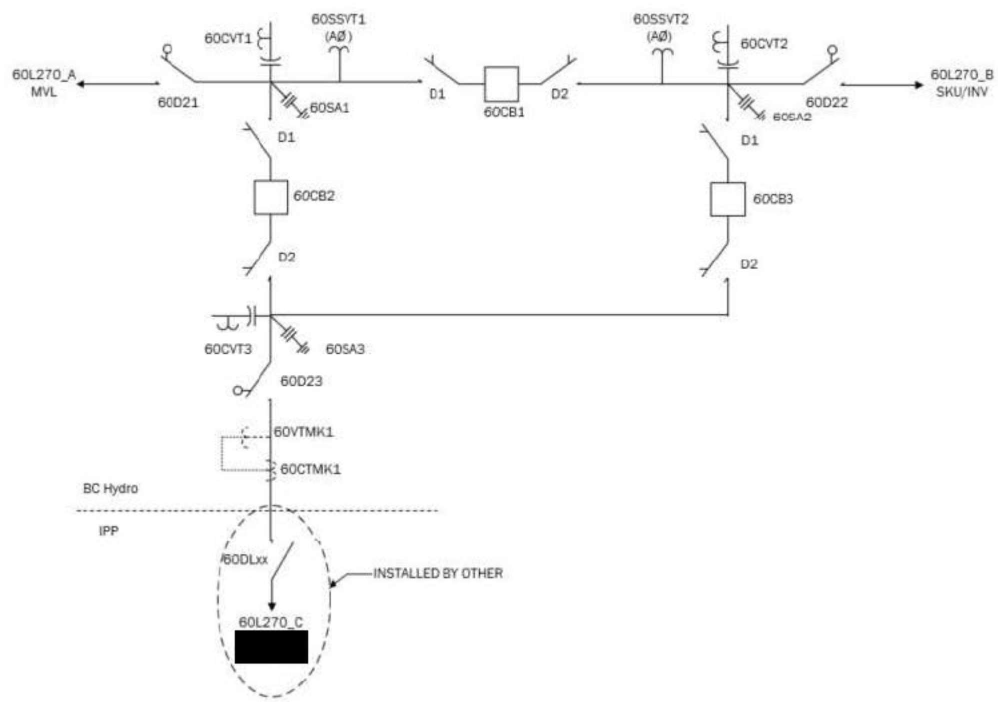

Figure B-1: Stations Planning One-Line Sketch for the New Switching Station P113T.